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Rasnick et al.

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[45] **Date of Patent: Feb. 14, 1989**

[54] **CONVERTIBLE BED**

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[73] Assignee: **Simmons U.S.A. Corporation**, Atlanta, Ga.

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[22] Filed: **Jun. 9, 1986**

[51] **Int. Cl.**[4] **A47C 17/04**

[52] **U.S. Cl.** ..... **5/18 R**; 5/37 R; 5/37 C; 5/41

[58] **Field of Search** ..... 5/18 R, 20, 17, 57 C, 5/37 R, 37 C, 41

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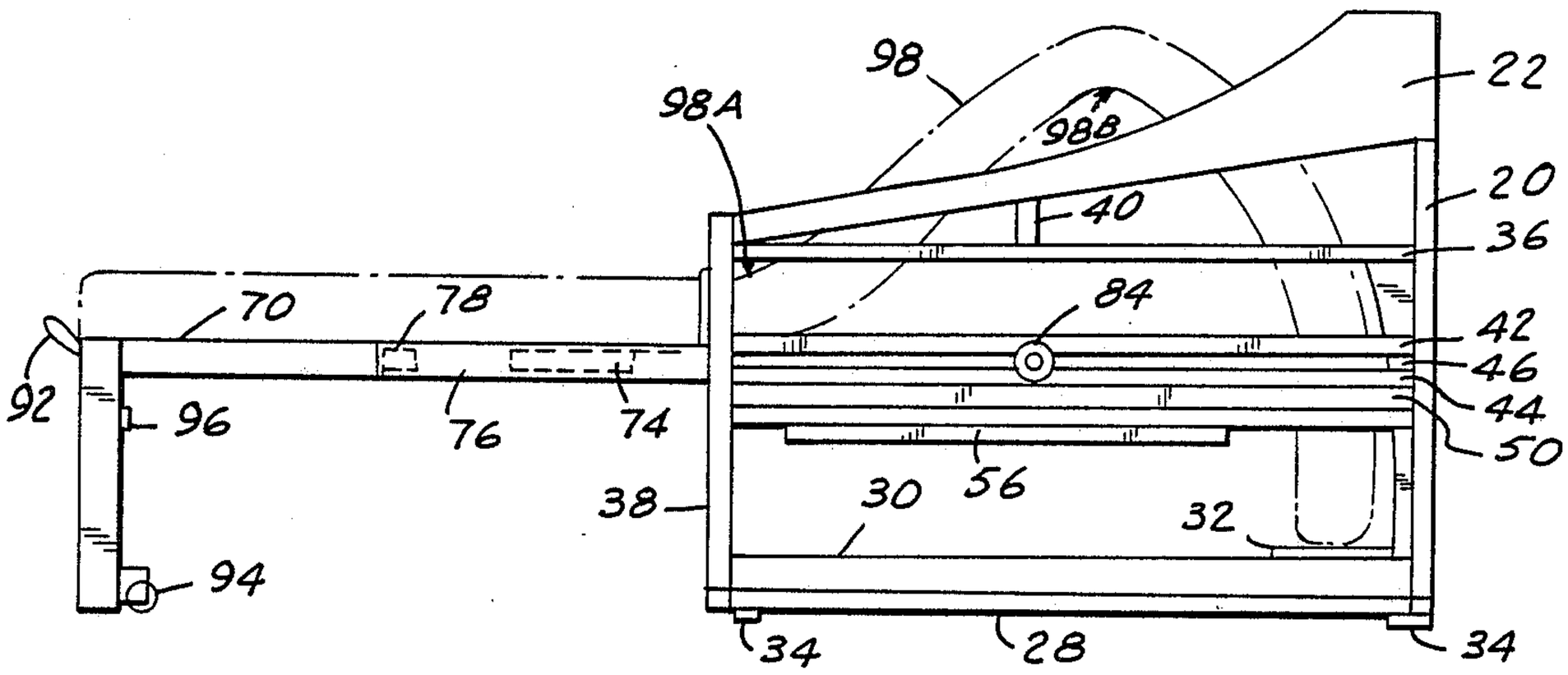
Primary Examiner—Michael F. Trettel
Attorney, Agent, or Firm—Jones, Askew & Lunsford

[57] **ABSTRACT**

A convertible bed assembly is provided which is movable between a seating position and a bed position. The assembly includes foot, intermediate and head support sections, the latter being fixedly mounted to a frame assembly. The three sections are arranged in telescoping relation such that all may fit within the frame assembly. The foot and intermediate sections are both pivotably mounted with respect to the frame assembly. An inclined or curved rear wall is provided to urge a mattress supported by the sections downwardly as it is moved in the direction of the head support section. As the mattress moves in this direction, it is folded into a seating position including a seat portion and a back portion.

26 Claims, 5 Drawing Sheets



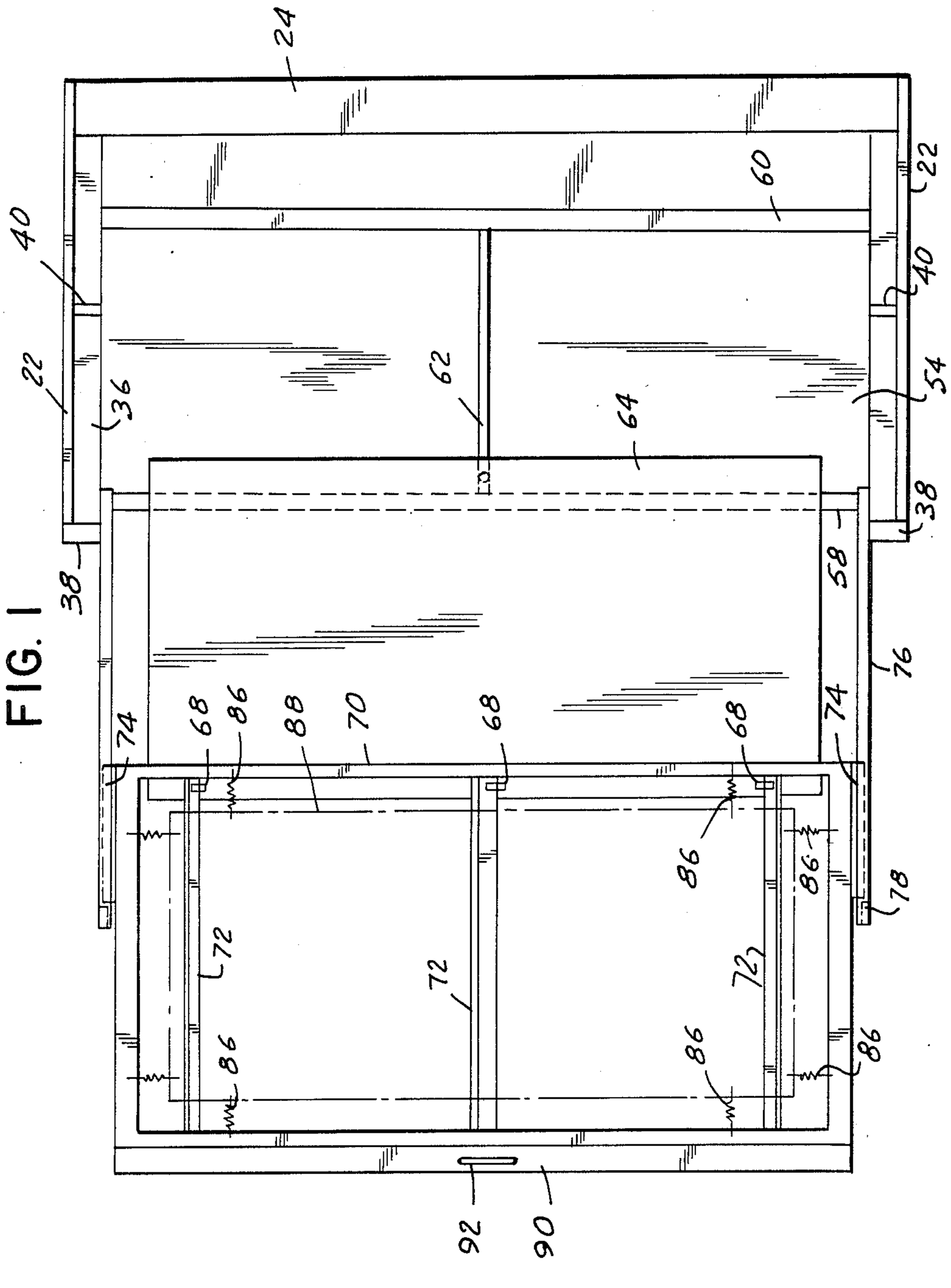

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FIG. 1

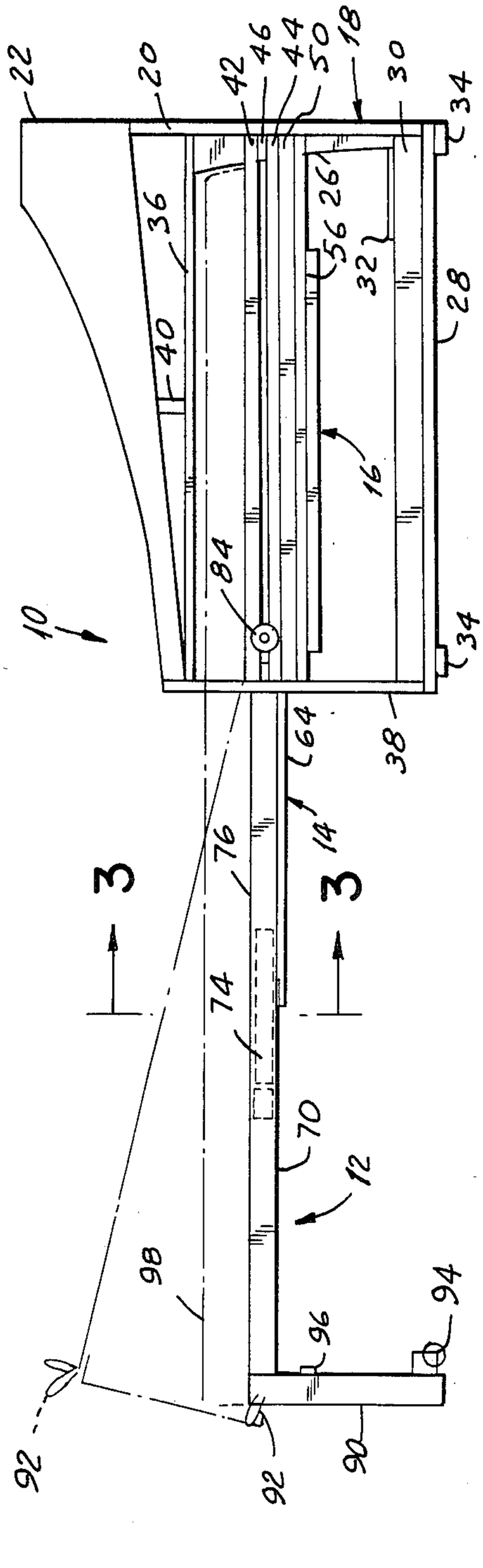
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FIG. 2

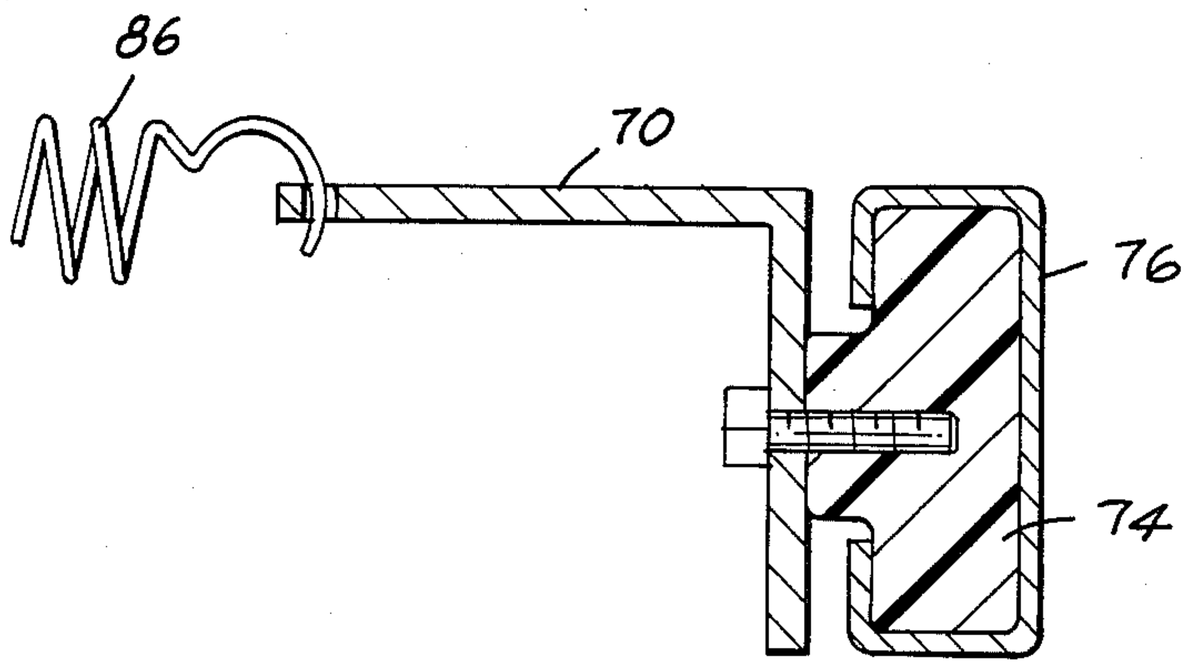

FIG. 3

FIG. 4

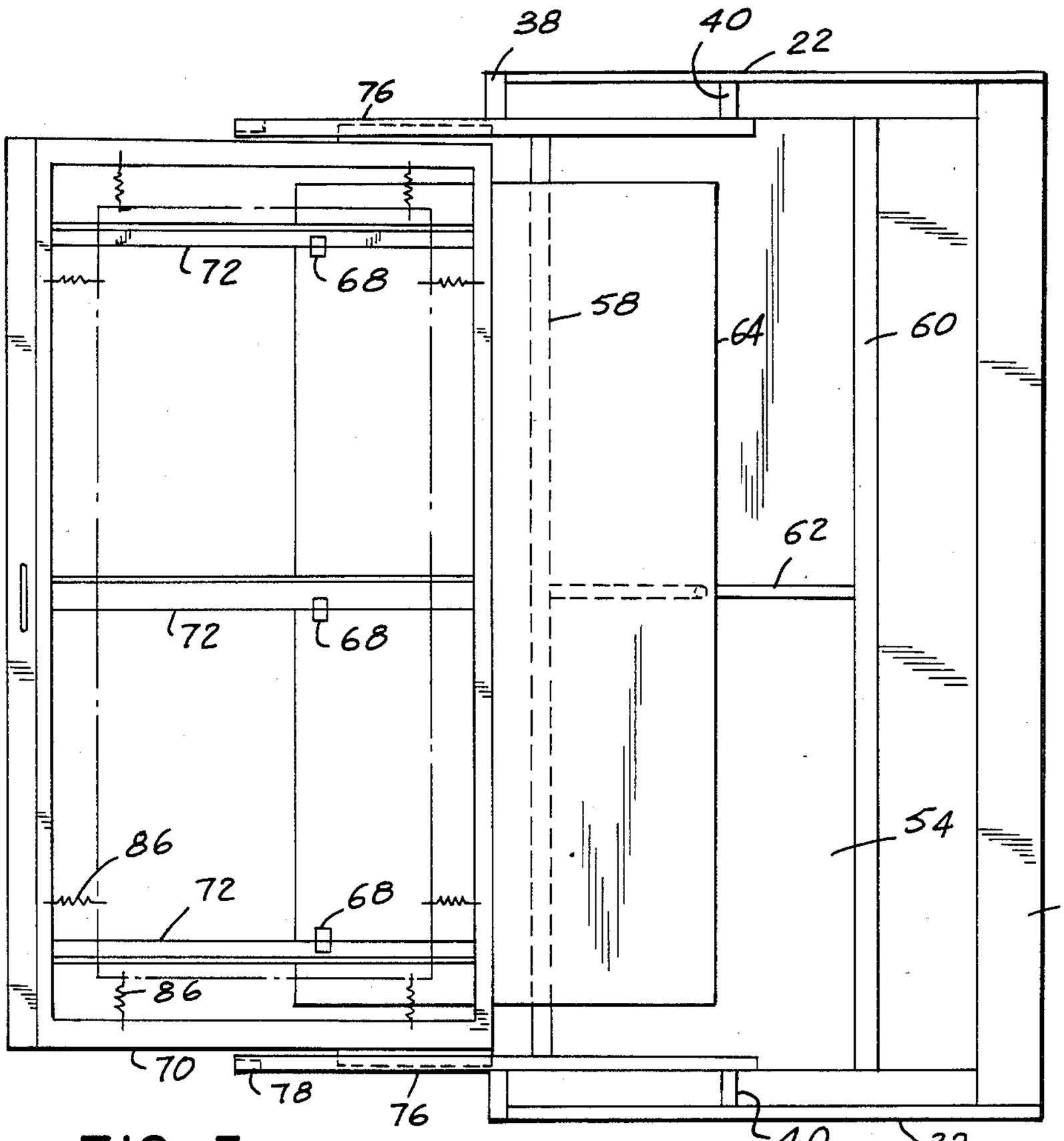
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FIG. 5

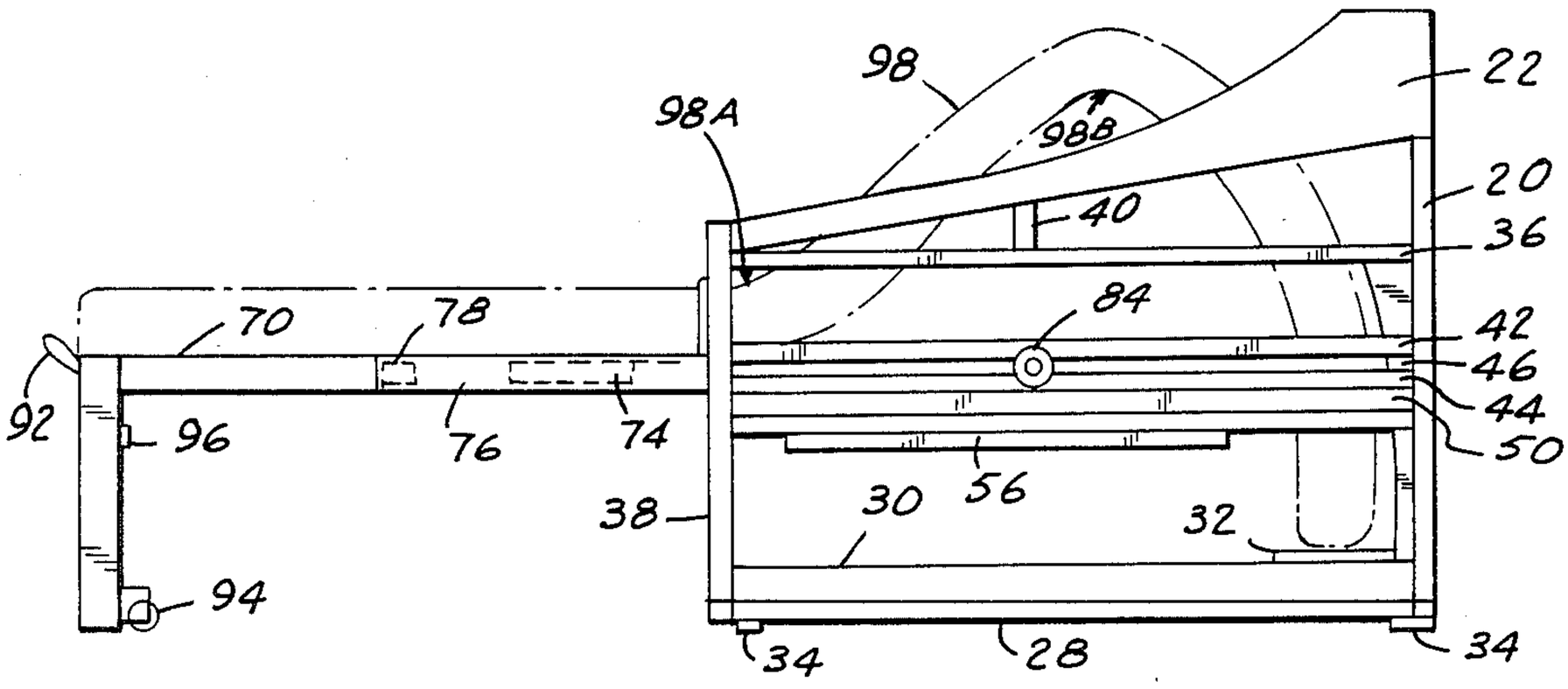
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FIG. 6

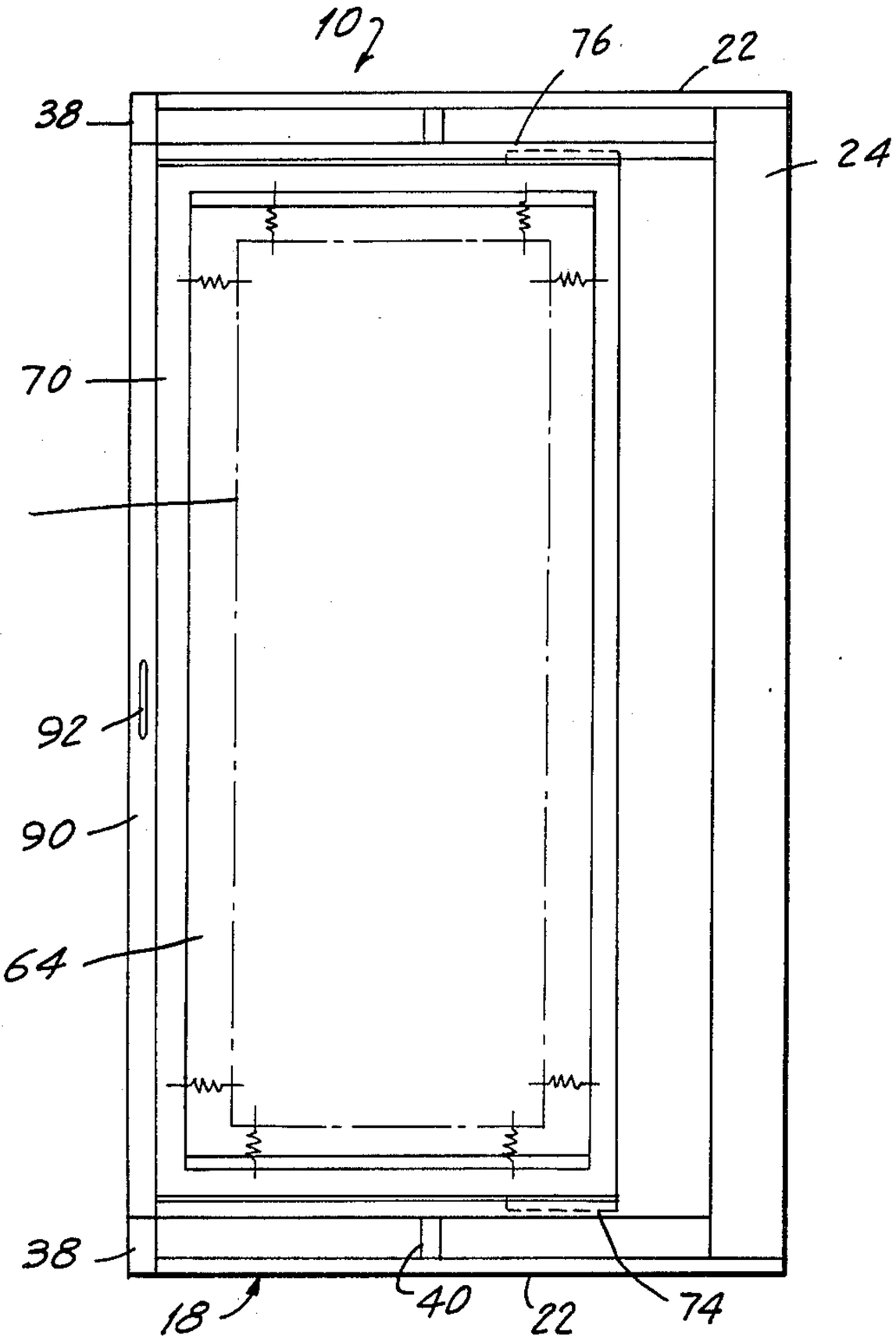

FIG. 7

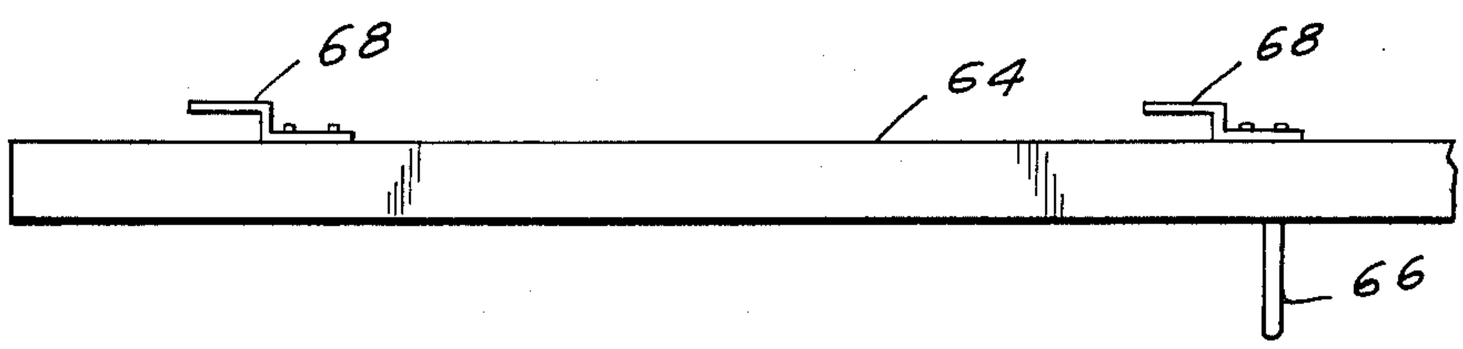

FIG. 8

CONVERTIBLE BED

BACKGROUND OF THE INVENTION

1. Field of the invention.

The field of the invention relates to convertible bed structures.

2. Background of the invention.

Convertible beds in use today typically employ linkage mechanisms which allow them to convert from sofas to beds. U.S. Pat. Nos. 3,047,886, 3,516,096, and 4,048,680 disclose sofa beds of this type.

A less common construction has no linkage mechanism and instead employs three pivotably connected support sections capable of defining an entirely flat surface or one having a seat and a back. In this construction, a mattress mounted thereon is folded between seating and reclining positions as the support sections are adjusted.

SUMMARY OF THE INVENTION

The present invention is directed to a sofa sleeper construction including a plurality of telescoping portions which allow a mattress supported thereon to be folded between a horizontal (bed) position and a folded position wherein it assumes the contours of a sofa. The construction preferable includes foot, middle and head portions. A mattress including an innerspring construction as disclosed in U.S. Pat. No. 4,234,984 may be utilized in conjunction with the invention as it is easily folded to the desired position.

In a preferred embodiment of the invention, the middle portion of the construction telescopes within the foot portion. The foot portion in turn telescopes within the head portion. The head portion is supported by a frame which is normally upholstered. The frame includes a rear wall positioned a selected distance from the rear end of the head portion, thereby defining a gap therebetween. The rear wall is preferably inclined or curved to urge the mattress downwardly as the portions telescope within each other.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top plan view of a convertible bed construction according to the invention in a fully extended position;

FIG. **2** is a side elevation view thereof;

FIG. **3** is a sectional view taken along the plane of line **3—3** in FIG. **2**;

FIG. **4** is a sectional view illustrating the connection of the foot portion of the invention with the frame thereof;

FIG. **5** is a top plan view of the construction shown in a partially closed position;

FIG. **6** is a side elevation view of the construction shown in FIG. **5**;

FIG. **7** is a top plan view of the construction in the fully closed position; and

FIG. **8** is a partial end view of the middle portion of the invention.

DETAILED DESCRIPTION OF THE INVENTION

A convertible bed construction **10** is provided which includes foot, middle and head sections **12, 14, 16**. The head section **16** is mounted to a frame **18** so that it remains in a fixed position with respect thereto.

Referring to FIGS. **1, 2** and **4**, the frame **18** includes a pair of rear, vertical support members **20**, a pair of top side panels **22** which fit within respective notches of members **20**, a top cross member **24** connecting the top side panels **22**, and an inclined or curved rear wall **26** supported by the rear support members **20**. The frame is basically made from wood while the curved rear wall is preferably made from a smoother material such as Masonite.

The bottom of the frame includes two pairs of elongate members **28,30**, one pair **30** of which is mounted on edge. A support member **32** extends between members **30** near the base of the curved wall **26**. Base blocks **34** are provided near each end of the elongate members **28** and normally rest upon the floor.

A pair of horizontally mounted side members **36** extends between the rear vertical support members **20** and respective front panels **38**. The front panels define the front arm portions of the frame **18** and are notched at the inside bottom portions to receive the front ends of members **30**. Support braces **40** connect the top side panels **22** with side members **36**.

A series of parallel members extend between the rear vertical support members **20** and the front panels **38**. Members **42** and **44** are both edge-mounted as shown in FIGS. **2** and **4** and define a slot **46** therebetween. The front ends thereof are positioned within respective, opposing notches (not shown) defined in the front panels **38**. The rear ends are secured to members **20**. A pair of elongate members **48** are secured near the respective bottom and top portions of members **42** and **44**. The opposing faces of these members **48** extend the length of the slot **46**.

An elongate member **50** is secured to the outer surface of each lower member **44**. The upper surface of member **50** is positioned parallel to and beneath the lower surface defining the slot **46**.

Opposing slots **52** are provided within the inner surfaces of members **44** to receive a panel **54** made from Masonite, plywood, or other material of suitable strength for supporting persons seated on a sofa bed. Support members **56** are secured to members **44** beneath the slots **52** to p[rovide additional support.

The frame panel **54** is secured to a wood cross member **58** at its front end and a second cross member **60** at its rear end. Both cross members **58, 60** are secured to members **44**. A longitudinal slot **62** extends between the cross members. The slot is defined by the inner edges of two adjacent panel portions which together comprise the panel or head section **16** of the bed construction **10**.

The middle portion **14** of the construction includes a panel **64** similar to the one mounted to the frame **18**. A pin **66** is secured to the bottom surface thereof. The pin is positioned near the rear end of the panel **64** and extends within slot **62**.

A plurality of s-shaped brackets **68** are mounted to the top side of panel **64** near the front end thereof. Two of such brackets are shown in FIG. **8**. The third bracket shown in FIG. **1** is identical to the first two but faces in the opposite direction.

The foot section **12** of the bed construction includes a substantially rectangular angle iron frame **70** having a plurality of longitudinal angle iron braces **72**. Two of the braces face in the same direction while the third faces in an opposite direction. This enables the brackets **68** to secure the middle panel **64** beneath the frame **70**.

A hat-shaped slide bearing **74** is bolted to each side of the frame **70** near the rear end thereof. The bearings are

each about nine inches long and are made from a material which slides easily along a metal surface. Ultra-high molecular weight polyethylene has been found to have sufficient strength and slidability for this purpose.

A C-shaped slide channel **76** is mounted to each slide bearing and is slidable with respect thereto. The front end of the slide channel includes a stop member **78** which contacts the bearing **74** when in the fully extending position shown in FIGS. **1–2**. The rear end thereof includes a second stop member **80** which supports an axle **82** and wheel **84**. The axles **82** extend respectively through slots **46** while the wheels **84** rest upon the upper surfaces of members **50**.

A plurality of coil springs **86** are mounted to the angle iron frame **70** for supporting a fabric or wire mesh grid **88** shown in phantom in the drawings. Such grids are well known in the art.

A front board **90** is bolted to the front end of frame **70**. The board supports the end of the bed construction. A strap **92** secured to the top of the board **90** allows the foot and intermediate portions of the bed construction to be pulled away from the frame **18** by the user. These two portions are pivotable about the axis running through the wheels **84** as shown in phantom in FIG. **2**. This allows a person to pull the foot and intermediate portions out without fully bending over. A set of wheels **94** mounted near the bottom of the board **90** allows it to move easily along the floor while being pushed in. A latch **96** is provided on the inner surface of the board. The latch secures the board to cross member **58** when the construction is in the closed position shown in FIG. **7**. The latch is released when the user pulls up the front board.

In use, the two panels **54, 64** and the grid **88** support a mattress **98** having sufficient flexibility to be folded into the contour of a sofa seat and back. Mattresses having innersprings made from rows of pocketed coil springs have been found to be suitable for this purpose.

The bed construction **10** is shown in the open or extended position in FIGS. **1–2** whereby it may be employed as a bed. The slide channels **76** are fully extended with respect to the angle iron frame **70** and the wheels **84** secured thereto are located at the front end of the slot **46**. Only a small end portion of the intermediate panel **64** is positioned beneath the angle iron frame **70** and its opposite end barely overlaps the frame panel **54**.

When one desires to move the construction into the closed position shown in FIG. **7** whereby it may be employed as a sofa, an inward force is exerted upon the front board **90**. The foot and intermediate sections **12, 14**, being conveniently pivotable about the axis passing through wheels **84**, may be moved towards the frame **18** without excessive bending by using the strap **92** to lift the board **90**. When inward movement begins, the head end of the mattress **98** contacts the curved rear wall **26** which directs it downwardly towards the support member **32**. Sufficient space is provided between the cross member **60** and this wall to allow such movement. The wall **26** is substantially the same width as the frame panel **54** and the mattress employed thereon. As the downward movement occurs, the mattress forms an upwardly extending loop as shown in FIG. **6**. Although relative movement of the foot and intermediate sections of the bed construction is not controlled, there will tend to be some movement of both during the opening and closing thereof. FIG. **5** shows the intermediate panel **64** as extending further under the angle iron frame **70** and overlapping more of the frame panel **54** then is shown in FIG. **1**. The slide channels **76** have also retracted towards the frame **70**, the wheels **84** thereof being positioned nearer the midpoint of the slot **46** as shown in FIG. **6**.

FIG. **7** shows the construction **10** (without the mattress) in the fully closed position. The intermediate panel **64**, having been guided by the pin **66** moving within the panel slot **62**, is positioned entirely within the main frame **18**. The angle iron frame **70**, having slided over the intermediate panel **64** as the angle iron braces **72** move within the panel brackets **68**, is also positioned within the main frame **18**. The latch **96** on the front board **90** latches to a complementary locking structure (not shown) on the cross members **58** to insure against the construction involuntarily reopening. The wheels **84** on the slide channels are positioned near the rear end of the slot **46** when in this position.

The mattress **98** defines the seat and back of a sofa when the sections **12, 14, 16** are positioned as shown in FIG. **7**. The first mattress fold **98A** shown in FIG. **6** would be about ninety degrees while the second fold **98B** would close almost entirely. The head end of the mattress is supported by member **32**.

It will be understood that substantially the entire frame **18**, including the front board **90**, is upholstered. The mechanisms by which the construction operates are accordingly normally hidden from view.

In addition to the advantages associated with the absence of complex mechanisms and many moving parts, the invention makes use of gravity during the closing operation rather than working against it as conventional sofa sleepers do. By using a curved or inclined rear wall to urge the head end of the mattress down, the weight thereof starts pulling the remainder of the mattress towards the frame **18**. The process is analogous to that of pushing a mattress off a table. The weight of the mattress moving down makes it far easier to push the rest of the mattress off the table. The telescoping foot, intermediate and head sections of the bed construction simply follow the movement of the mattress.

We claim:

1. A convertible bed assembly comprising:

a one piece mattress means having a headward and a footward end;

a frame assembly, said frame assembly including a front end, a rear end, and a first section having a first support surface that supports at least part of said mattress means;

means for urging said mattress means positioned on said frame assembly along a predetermined path such that the headward end of said mattress means moves downwardly and below said first support surface, and the footward end of said mattress means moves rearwardly over said first support surface; and

mattress end supporting means located below said first support surface for stopping travel of said mattress means proximate said end at a predetermined point along said predetermined path such that an intermediate portion of said mattress means bows upwardly and out of said predetermined path.

2. A convertible bed assembly as defined in claim **1** wherein said urging means includes a rear member having an inclined surface positioned rearwardly of said first support surface, said rear member being mounted to said frame assembly and positioned a selected distance from said first support surface whereby said mat-

tress means may move downwardly between said rear member and the rear end of said first section.

3. A convertible bed assembly as defined in claim 2 wherein said inclined surface is part of a curved surface upon said rear member.

4. A convertible bed assembly as defined in claim 2 including a second section defining a second support surface, means for mounting said second section to said frame assembly such that it may be moved within said frame assembly or out the front end thereof, one of said first and second support surfaces at least partially overlapping the other when said second section is positioned within said frame assembly.

5. A convertible bed assembly as defined in claim 4 including a means for pivotably mounting said second section to said frame assembly.

6. A convertible bed assembly as defined in claim 4 including a third section defining a third support surface, means for mounting said third section to said frame assembly such that it may be moved within said frame assembly or out the front end thereof, said first, second and third support surfaces being in an overlapping position with respect to each other when positioned within said frame assembly.

7. A convertible bed assembly as defined in claim 6 including means for pivotably mounting said second and third sections with respect to said frame assembly.

8. A convertible bed assembly as defined in claim 6 wherein said third section includes a substantially rectangular frame, first and second arms slidably mounted to opposite sides of said substantially rectangular frame, and a wheel mounted near one end of each of said arms, each of said wheels being supported by said frame assembly.

9. A convertible bed assembly as defined in claim 8 wherein said second section is slidably mounted to said substantially rectangular frame.

10. A convertible bed assembly as defined in claim 9 wherein said second section is slidably mounted to said first section.

11. A convertible bed assembly as defined in claim 8 wherein said frame assembly includes first and second longitudinal members extending horizontally between said front and rear ends thereof, said wheels being respectively supported by said first and second longitudinal members and capable of rolling thereon.

12. A convertible bed assembly as defined in claim 8 including a front board mounted to one end of said substantially rectangular frame, said front board including a latch for locking it to said frame assembly.

13. A convertible bed assembly as defined in claim 2 wherein said frame assembly includes a base portion, said first support surface being substantially horizontal and mounted a selected distance above said base portion, and at least part of said inclined surface extending higher than said first support surface.

14. A convertible bed assembly as defined in claim 13 wherein said rear member is a rear wall positioned said selected distance behind said first section and extending above and below said first support surface, said first support surface being defined by a substantially rectangular panel of selected length and width, said inclined surface having substantially the same width as said substantially rectangular panel.

15. A convertible bed assembly comprising:

a one piece mattress means including a headward and a footward end;

means for supporting said mattress means in a first reclining position such that said mattress means is substantially horizontal;

a mattress means end supporting member; and

means for urging said mattress means from said first position along a predetermined path such that said headward end of said mattress means encounters said mattress means end supporting member and is urged against said mattress means end supporting member, such that said mattress means bows upwardly out of said predetermined path intermediate its headward and footward ends, and said mattress means assumes a second sitting position with a portion of said mattress means being inclined from horizontal.

16. A convertible bed assembly as claimed in claim 15, wherein said mattress end supporting member comprises an elongate member having a longitudinal axis, said elongate member being positioned in the path of said headward end of said mattress means such that said longitudinal axis is substantially perpendicular to the path of travel of said mattress means end.

17. A convertible bed assembly as claimed in claim 16, further comprises means for urging said mattress means downwardly comprising a wall defining an inclined surface, said inclined surface being positioned in said path of travel such that said mattress means end contacts said inclined surface and slidably follows a portion of said inclined surface toward said mattress means end supporting member.

18. A convertible bed assembly as claimed in claim 17, wherein said inclined surface is part of a curved surface defined by said wall.

19. A convertible bed assembly as claimed in claim 15, further comprises means for urging said mattress means end downwardly comprising a wall defining an inclined surface, said inclined surface being positioned in said path of travel such that said mattress end contacts said inclined surface and slidably follows a portion of said inclined surface toward said mattress means end supporting member.

20. A convertible bed assembly as claimed in claim 19, wherein said inclined surface is part of a curved surface defined by said wall.

21. A convertible bed assembly comprising:

a one piece mattress means including a headward and a footward end and a headward, middle, and a footward section;

means for supporting said mattress means in a first reclining position such that said headward, middle, and footward sections of said mattress means are substantially horizontal;

a mattress means end supporting member;

means for urging said mattress means from said first position along a predetermined path such that said headward end of said mattress means encounters said mattress means end supporting member and is urged against said mattress means end supporting member, such that said mattress bows upwardly out of said predetermined path along the intersection of said headward and middle sections, and said mattress means assumes a second sitting position with said headward and said middle sections being inclined from horizontal.

22. A convertible bed assembly as claimed in claim 21, wherein said mattress means end supporting member comprises an elongate member having a longitudinal axis, said elongate member being positioned in the

path of said headward end of said mattress means such that said longitudinal axis is substantially perpendicular to the path of travel of said mattress means end.

23. A convertible bed assembly as claimed in claim **22**, further comprises means for urging said mattress means end downwardly comprising a wall defining an inclined surface, said inclined surface being positioned in said path of travel such that said mattress means end contacts said inclined surface and slidably follows a portion of said inclined surface toward said mattress means end supporting member.

24. A convertible bed assembly as claimed in claim **23**, wherein said inclined surface is part of a curved surface defined by said wall.

25. A convertible bed assembly as claimed in claim **21**, further comprises means for urging said mattress means end downwardly comprising a wall defining an inclined surface, said inclined surface being positioned in said path of travel such that said mattress means end contacts said inclined surface and slidably follows a portion of said inclined surface toward said mattress means end supporting member.

26. A convertible bed assembly as claimed in claim **25**, wherein said inclined surface is part of a curved surface defined by said wall.

* * * * *